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imbedding processes, the use of the microtome and the care of knives. This expands the introduction from 11 to 66 pages.

Another improvement consists in placing at the head of each chapter a list of the materials needed for the task which follows. Besides this indication of the contents of each chapter there is in the table of contents a full analysis of it so that anything is readily found. Besides this, in the voluminous indexes, upon which unusual care is bestowed, every point is completely covered. These indexes extend to 109 pages. The only improvement that could be made would be to combine them into one. A single index is more readily used than six. An exception should be made of the second, which is not really an index, but gives a list of plants used, arranged according to the time at which they should be collected.

The number of figures has been increased from 193 to 221; but the number of plants treated has been decreased in order to make room for the introduction of new technique without unduly increasing the size of the book. At first sight this seems to have been done, but the number of pages is only greater by 66 than in the second edition. The apparent increase is chiefly due to thicker paper.

The third edition is fitted by the many important changes in text, as well as these more superficial ones, to maintain the reputation which its predecessors have won, and students are under a new debt of gratitude to this indefatigable author, who takes time to put at the disposal of both beginners and investigators his great experience and encyclopedic knowledge.—C. R. B.

### Index to Saccardo's Sylloge.

The eleven thick royal octavo volumes containing descriptions of all fungi known before 1895 form a monumental work; and to the author, Professor P. A. Saccardo of Padua, Italy, all mycologists are under the greatest obligation. The publication of the work began in 1882 and was brought to a successful close in 1895, the several volumes succeeding one another at surprisingly short intervals, considering the vast amount of labor involved. The author is now increasing the value of the work for ready reference by issuing a comprehensive index,<sup>2</sup> forming the twelfth and final volume. It gives all the genera in a single alphabetical list, with species, varieties, etc., under each genus, and also the hosts and the geographical distribution. The general arrangement and the typographical execution are excellent. A better index could not well be devised. The first part now issued extends as far as *Puccinia Pyrolæ*, showing that it probably includes fully half the volume. It

<sup>2</sup>SACCARDO, P. A.—Sylloge fungorum omnium huiusque cognitorum. Vol. 12. Index universalis et locupletissimus generum, specierum, subspecierum, varietatum hospitumque in toto opere expositorum. Pars 1. Roy. 8vo. pp. 640. Berolini, Fratres Borntraeger, 1896. 40 francs.

is, however, entirely unaccompanied by information regarding subsequent publication, there being no preface, outline, introduction, or explanatory note. But every part of this index is of greatest service to those who have occasion to consult the work, and we are grateful to have the use of the first part while the second is in preparation.—J. C. A.

### **An introduction to horticulture.**

The arrangement into a clear and well-defined science of the principles which underlie an old and empirically developed art is a matter of slow growth. Horticulture boasts of being the oldest of human arts, and yet the science of horticulture is ill defined and without adequate representation in logical form. Especially since the establishment of colleges for the teaching of agriculture and allied subjects a concise text-book to serve as a basis for horticultural teaching has been a genuine desideratum.

A work that appears in many ways to possess the right qualities for meeting in part these demands has recently been put forth by Professor Emmet S. Goff<sup>3</sup> of the University of Wisconsin. The work is the outgrowth of the author's long experience in teaching horticulture, supplemented by especially successful labors as an experimental horticulturist.

In contrast with the usual method of writing a general treatise and subsequently condensing an introductory work from it, the author has first prepared the elementary text. The work is designed for students in first-year college work, having little or no previous instruction in chemistry, physics, or botany. The work opens with a dozen pages of fundamental matters, clearly and succinctly stated. The remainder of the work is divided into four parts: *a*, the round of plant life from germination to the production of seed, with many details of structure and physiological action; *b*, the plant as affected by unfavorable environment, such as extremes of temperature, light, water, food, etc., embracing a variety of ecological observations of great interest to the cultivator; *c*, plant manipulation, especially propagation by seeds and division, transplanting and pruning; and *d*, plant breeding. In an appendix is given an outline for a course of sixty or more laboratory experiments to practically illustrate the text.

The work is written in a lucid and crisp style, well paragraphed for class use, and throughout imparts the feeling of a strictly scientific treatment, always apropos, however, of work-a-day application.

There is little in the book that invites adverse criticism. The only matter worth mentioning is the use of the term assimilation. It is made to cover the formation of plant food by chlorophyll bodies, a time-honored usage, but

<sup>3</sup> GOFF, E. S.—Principles of plant culture: an elementary treatise designed as a text-book for beginners in agriculture and horticulture. Madison, 1897. Published by the author. 12mo, pp. 276. 173 illustrations.